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METHOD AND APPARATUS FOR AVOIDING MUTUAL INTERFERENCE WHEN CO-LOCATING MOBILE STATION AND BLUETOOTH SYSTEMS

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TECHNICAL FIELD:

These teachings relate generally to wireless communications devices and systems and, more specifically relate to the simultaneous use of two wireless transceivers and the mitigation of co-interference.

BACKGROUND:

As cellular telephones and other types of wireless personal communication devices evolve there is and will be a tendency to provide additional capabilities by including a separate low power RF communication subsystem for enabling the local control of peripheral devices and the transfer of data between the local peripherals and the communication device. Such peripherals may include headsets, printers, portable computers and the like. One emerging technology for providing this enhanced capability is known as Bluetooth.

In the Bluetooth model a protocol stack includes a radio layer at the bottom which forms a physical connection interface. A Baseband layer and a Link Manager Protocol (LMP) layer reside over the Radio layer for establishing control links between Bluetooth devices. These three bottom layers are typically implemented in hardware/firmware. A Host Controller layer is provided to interface the Bluetooth hardware to an upper protocol-L2CAP(Logical Link Control and Adaptation Protocol). The Host Controller layer is normally required only when the L2CAP resides in software in the host. If the L2CAP is also on the Bluetooth module, this layer may not be required as the L2CAP can directly communicate with the LMP and baseband layers. One or more applications reside above L2CAP layer. Of most interest to the teachings herein are the lower-most layers, including the Baseband and Radio layers or levels.

The Radio layer provides a wireless (RF) link that operates in the unlicensed ISM band around 2.4GHz using spread spectrum communication techniques. The band extends from 2400 MHz to 2483.5 MHz in most countries, and this entire spectrum range is utilized for optimizing spectrum spreading. A frequency hopping technique is used to

provide the spread spectrum function. As multiple uncoordinated networks may exist in this band and may cause interference, fast frequency hopping and short data packets are used. The error rate may be high, especially due to strong interference from microwave ovens which operate at this frequency. CVSD coding has been adopted for voice communication, which can withstand high bit error rates. In addition, the packet headers are protected by a highly redundant error correction scheme to make them robust to errors.

The frequency hops are fixed at 2402+k MHz, where k= 0,1,...,78. The nominal hop rate is 1600 hops per second, yielding a single hop slot width or time of 625 microseconds. The modulation used is Gaussian prefiltered Binary FSK, and the Gaussian filter has BT=0.5. The transmitter power is fixed at 0dBm for a 10m range , and can be increased to 20dBm for a 100m range.

The Baseband layer is the layer that controls the Radio layer. The frequency hop sequences (pseudorandom) are provided by the Baseband layer. The Baseband layer also performs lower level encryption for secure links, and is responsible for packet handling over the wireless link.

Two types of links can be established. These are Synchronous Connection Oriented (SCO) links intended for synchronous data, typically voice, and Asynchronous Connectionless (ASO) links used for data transfer applications that do not require a synchronous link.

The Baseband layer further provides the functionalities required for devices to synchronize their clocks and establish connections. Inquiry procedures for discovering the addresses of devices in proximity are also provided. Error correction for packets is provided depending on the type of packet. Various packet types are specified for some common applications, differing in their data capacity and error correction overheads. Five different channel types are provided: control information, link management information, user synchronous data, user asynchronous data and isosynchronous data. Data whitening is also carried out at the Baseband layer.